Patent claims

1. A composite profiled section comprising a basic profiled section (1) made from a material with a good electrical conductivity and at least one surface coating which is joined to the basic profiled section and is made from a material with a higher resistance to abrasion, in particular a metal wearable strip (19), wherein the wearable strip (19), on at least one of its longitudinal edges (23), has recesses (27), indentations (77, 78) or stamped-in portions (82), which are at least partially filled by means of a joining material (59) or joining profiled section (11, 39, 66, 69, 74) and are thus joined to the basic profiled section (1) in a nonpositively and/or positively locking manner.

2. The composite profiled section as claimed in claim 1, wherein the steel strip (19) has a thickness (d) of from 2-15 mm.

3. The composite profiled section as claimed in claim 1 or 2, wherein the steel strip (19), transversely with respect to its longitudinal axis, has a bulge with an external radius (R) which is up to 15 times the profiled-section height H.

4. The composite profiled section as claimed in one of claims 1 to 3, wherein the steel strip (19), along at least

one longitudinal outer edge, is folded or bent over, oriented at an angle (g) of up to 150° with respect to the basic profiled section (1), so as to form a steel-strip limb (20).

5. The composite profiled section as claimed in claim 4, wherein the steel-strip limb (20) encloses the rail head (3) at least on one side of the basic profiled section (1) and, over a height (j), forms the profiled-section side of the rail head (3).

6. The composite profiled section as claimed in claim 4 or 5, wherein the steep-strip limbs (20), with a depth (k) of up to three times the steel-strip thickness (d), are laterally joined, in the rail head (3), to the basic profiled section (1).

7. The composite profiled section as claimed in at least one of claims 1 to 5, wherein the steel strip (19), in the region of the radii of the longitudinal outer edge (23) or longitudinal inner edge (22) or adjoining them at the front and/or at the back, at least has individual indentations (80, 81) or notches.

8. The composite profiled section as claimed in at least one of claims 4 to 7, wherein the steel strip (19), at least

along one longitudinal outer edge (23) or one steel-strip limb (20), has recesses (27).

9. The composite profiled section as claimed in claim 8, wherein the recesses (27) are at equidistant spacings (s).

10. The composite profiled section as claimed in claim 8 or 9, wherein the recesses for opposite steel-strip limbs (20) of the steel strip (19) are preferably offset from one another by half the spacing (s) between the recesses (27).

11. The composite profiled section as claimed in one of claims 8 to 10, wherein a plurality of recesses (27) in a steel-strip limb (20) form a group (28) of recesses, which for their part are at equidistant spacings from one another.

12. The composite profiled section as claimed in at least one of claims 8 to 11, wherein the recesses (27) are designed substantially in the form of slots.

13. The composite profiled section as claimed in at least one of claims 8 to 12, wherein the recesses (27) have a spacing of up to a multiple of their own length between them.

14. The composite profiled section as claimed in at least one of claims 1 to 13, wherein a center axis M of the recess

(27.2) is at an angle (b) of between -60° and +60° with respect to the surface of the steel strip (19).

15. The composite profiled section as claimed in at least one of claims 1 to 13, wherein the recess (27.1), at an angle (a/2) with respect to the center axis (M) of from -45° to +45°, is of conical design.

16. The composite profiled section as claimed in at least one of claims 1 to 15, wherein the recesses (27) circumferentially have a funnel-shaped chamfer at an angle (p) of from 30° to 120° with respect to the center axis (M).

17. The composite profiled section as claimed in at least one of claims 1 to 16, wherein the recesses (27), on the edge side, define an anchor bar (25) of a height (h) of at least 1 mm.

18. The composite profiled section as claimed in at least one of claims 1 to 17, wherein the steel-strip limbs (20), on one or both sides, are reduced by a certain dimension (u3 or u4 or u3 and u4) with respect to the thickness (d) of the steel strip (19).

19. The composite profiled section as claimed in at least one of claims 1 to 18, wherein the steel-strip limbs (20), on

one or both sides, have individual or multiple stamped-in portions (82) and/or indentations (77, 78), if appropriate on their own or in addition to recesses (27).

20. The composite profiled section as claimed in at least one of claims 1 to 19, wherein joining webs (21) between the recesses (27) are reduced, on one or both sides, by a certain dimension (u1 or u2 or u1 and u2) with respect to the thickness (d) of the steel strip (19).

21. The composite profiled section as claimed in at least one of claims 17 to 20, wherein the anchor bar (25) is inclined at an angle (c) of from -45° to +45° with respect to the surface of the steel strip (19).

22. The composite profiled section as claimed in at least one of claims 1 to 21, wherein the basic profiled section (1) and/or the joining profiled section (39) has profiled-section limbs (11, 41) on at least one side of the rail head (3).

23. The composite profiled section as claimed in claim 22, wherein the profiled-section limb (11, 41) has a profiled-section limb lug (63) which is directed substantially toward the basic profiled section (1).

24. The composite profiled section as claimed in claim 22 or 23, wherein the profiled-section limb (11, 41) has an internal slope (33).

25. The composite profiled section as claimed in at least one of claims 22 to 24, wherein the profiled-section limb (11, 41) has an outer profiled-section thickened part (43).

26. The composite profiled section as claimed in one of claims 22 to 25, wherein the profiled-section limb (11, 41) has an inner profiled-section thickened part (45).

27. The composite profiled section as claimed in at least one of claims 22 to 26, wherein the profiled-section limb (11, 41) has a transverse step (12).

28. The composite profiled section as claimed in at least one of claims 22 to 27, wherein the profiled-section limb (11, 41) is of substantially negative form with respect to the contact surface with the steel-strip limb (20).

29. The composite profiled section as claimed in at least one of claims 1 to 28, wherein the basic profiled section (1), on both sides of a profiled-section web (5), in the center or along the line of intersection defined by the plane

of symmetry of a profiled-section pocket (15) and a surface of the profiled-section web (5), has a furrow (17).

30. The composite profiled section as claimed in at least one of claims 1 to 29, wherein the basic profiled section (1) has a profiled-section shoulder (35).

31. The composite profiled section as claimed in at least one of claims 1 to 30, wherein the limb groove (36) of the basic profiled section (1) has a profiled-section molded protuberance (37) in the region behind the recesses (27), substantially having a width (e) of the recesses (27) and a depth (t) which is up to 75% of the steel-strip thickness (d).

32. The composite profiled section as claimed in at least one of claims 1 to 31, wherein the basic profiled section (1) has an insert groove (49) for a joining profiled section (39).

33. The composite profiled section as claimed in claim 32, wherein the insert groove (49) opens out toward the groove base (50).

34. The composite profiled section as claimed in claim 32 or 33, wherein the insert groove (49) has undercuts on the groove base (50).

35. The composite profiled section as claimed in one of claims 32 to 34, wherein the insert groove (49) has a spreading pedestal (51) on the groove base (50), with an interior angle of from 5° to 120°.

36. The composite profiled section as claimed in at least one of claims 32 to 35, wherein the insert groove (49) has a funnel-shaped bevel (53).

37. The composite profiled section as claimed in at least one of claims 32 to 36, wherein the inner surfaces of the insert groove (49) have an undulating structure or barb-like toothing or the like.

38. The composite profiled section as claimed in at least one of claims 32 to 37, wherein at least a section of an inner surface of the insert groove (49) has an approximately circular internal molded niche (54).

39. The composite profiled section as claimed in at least one of claims 1 to 38, wherein the basic profiled section (1) has a filling recess (61) or calking groove (67)

substantially behind the recesses (27) in the steel-strip limbs (20).

40. The composite profiled section as claimed in claim 39, wherein the filling recesses (61) or calking grooves (67) widen toward the groove base.

41. The composite profiled section as claimed in claim 39 or 40, wherein the filling recesses (61) or calking grooves (67) have undercuts.

42. The composite profiled section as claimed in one of claims 39 to 41, wherein the filling recesses (61) or calking grooves (67) have a depth of up to three times the steel-strip thickness (d).

43. The composite profiled section as claimed in at least one of claims 39 to 42, wherein the center axis M has filling recesses (61) or calking grooves (67) which are at an angle (b) of from -60° to +60° with respect to the surface of the steel strip (19).

44. The composite profiled section as claimed in at least one of claims 39 to 43, wherein the filling recesses (61) or calking grooves (67) have a barb-like internal molded niche (68) on the inner surfaces.

45. The composite profiled section as claimed in at least one of claims 39 to 44, wherein the filling recesses (61) or calking grooves (67) have at least one resilient tongue (70) on one of their inner surfaces and directed substantially toward the groove base (50).

46. The composite profiled section as claimed in at least one of claims 1 to 45, wherein the basic profiled section (1) has a clamping molded protuberance (87) toward at least one inner corner of the steel strip (19).

47. The composite profiled section as claimed in at least one of claims 1 to 46, wherein the basic profiled section (1) has a spreading molded protuberance (83) toward at least one inner corner of the steel strip (19).

48. The composite profiled section as claimed in at least one of claims 1 to 47, wherein the basic profiled section (1) has at least one profiled-section recess (85) or groove (89) or the like at the joining surface with respect to the steel strip (19).

49. The composite profiled section as claimed in at least one of claims 1 to 48, wherein a rail foot (9) has at least one profiled-section notch (13).

50. The composite profiled section as claimed in claim 49, wherein the inner flanks (91) of the profiled-section notch (13.1) form an angle (W) of less than 90° with the groove base.

51. The composite profiled section as claimed in claim 49, wherein the profiled-section notch (13) has an undercut (93) or latching groove on at least one inner flank (91).

52. The composite profiled section as claimed in claim 49, wherein the profiled-section notch (13) has an insert groove (95).

53. The composite profiled section as claimed in claim 52, wherein the insert groove (95) serves primarily to accommodate and/or secure a sliding strip (7.3).

54. The composite profiled section as claimed in claim 52 or 53, wherein the insert groove (95), by extending and substantially continuing the contour of the inner surface or the groove base of the profiled-section notch (13), projects into the basic profiled section (1) or the profiled-section web (5) or profiled-section foot (9).

55. The composite profiled section as claimed in one of claims 52 to 54, wherein the insert groove (95) has a clamping angle (q) of up to 30°.

56. The composite profiled section as claimed in at least one of claims 52 to 55, wherein the insert groove (95) has a clamping lug (94) on at least one lateral inner surface.

57. The composite profiled section as claimed in at least one of claims 52 to 56, wherein at least sections of the lateral inner surfaces of the insert groove (95) have an undulating structure or barb-like toothing or the like.

58. The composite profiled section as claimed in at least one of claims 52 to 57, wherein the lateral projection (100) which is formed by the insert groove (95) is designed as a resilient limb.

59. The composite profiled section as claimed in at least one of claims 52 to 58, wherein the insert groove (95) is of substantially convex or concave (13.2) design.

60. The composite profiled section as claimed in at least one of claims 52 to 59, wherein the profiled-section notch (13) has at least one further securing groove (97).

61. The composite profiled section as claimed in claim 60, wherein the securing groove (97) has an undercut (96).

62. The composite profiled section as claimed in claim 60 or 61, wherein the securing groove (97) has a funnel-shaped formation or bevel (106).

63. The composite profiled section as claimed in one of claims 60 to 62, wherein the securing groove (97) is preferably formed in the center of the insert groove (13).

64. The composite profiled section as claimed in at least one of claims 1 to 63, wherein the basic profiled section (1), on an underside (8) of the rail foot (9), has a bearing surface (98) which is substantially perpendicular to the center axis of the connecting element (99).

65. The composite profiled section as claimed in at least one of claims 1 to 64, wherein the basic profiled section (1), on the underside (8) of the rail foot (9), has at least one positioning furrow (102).

66. The composite profiled section as claimed in at least one of claims 1 to 65, wherein the basic profiled section (1) has at least one further securing groove (101) on the

underside (8) and/or one of the side faces of the rail foot (9).

67. The composite profiled section as claimed in claim 66, wherein the securing groove (101) has undercuts (96).

68. The composite profiled section as claimed in at least one of claims 1 to 67, wherein the basic profiled section (1) has at least one latching groove (103) on one of the outer sides of the rail foot (9).

69. The composite profiled section as claimed in at least one of claims 1 to 68, wherein the basic profiled section (1) has at least one further insert groove (109) for a further sliding profiled section (7.7) on the underside (8) of the rail foot (9).

70. The composite profiled section as claimed in at least one of claims 1 to 69, wherein the basic profiled section (1) has a profiled-section notch around at least one outer limb of the rail foot (9), for a sliding strip (7.5, 7.8) which is substantially in the form of a half-shell or is bent in the manner of a clamp.

71. The composite profiled section as claimed in claim 70, wherein the profiled-section notch runs as far as into the rail web (5).

72. The composite profiled section as claimed in at least one of claims 1 to 71, wherein a sliding strip (7) is inserted or mounted in one of the profiled-section notches (13, 109).

73. The composite profiled section as claimed in claim 72, wherein the sliding strip (7) runs along the entire length of the conductor rail.

74. The composite profiled section as claimed in claim 73, wherein sections of the sliding strip (7), generally of a length of up to 500 mm, are inserted or mounted at at least one position along the basic profiled section (1).

75. The composite profiled section as claimed in at least one of claims 72 to 74, wherein the basic profiled section (1) has in each case one sliding strip (7) or strip section arranged in pairs on opposite limbs of the rail foot (9).

76. The composite profiled section as claimed in at least one of claims 72 to 75, wherein the sliding strip (7) is substantially a metal strip or strip section.

77. The composite profiled section as claimed in claim 76, wherein the sliding strip (7) is made from stainless steel.

78. The composite profiled section as claimed in claim 76, wherein the sliding strip (7) is made from a spring metal sheet.

79. The composite profiled section as claimed in at least one of claims 72 to 78, wherein the sliding strip (7) consists of an electrically nonconductive material.

80. The composite profiled section as claimed in at least one of claims 72 to 78, wherein the sliding strip (7) is designed in cross section as a profiled section.

81. The composite profiled section as claimed in at least one of claims 72 to 80, wherein the sliding strip (7) has recesses (105).

82. The composite profiled section as claimed in at least one of claims 72 to 81, wherein the sliding strip (7) has at least one latching tongue (104) on a longitudinal edge (110).

83. The composite profiled section as claimed in at least one of claims 72 to 82, wherein the sliding strip (7) has a molded strip protuberance (107) or the like.

84. The composite profiled section as claimed in at least one of claims 72 to 83, wherein the sliding strip (7) rests in the profiled-section recess (13) in such a way that the outer surface substantially forms the surface which the basic profiled section (1) would have without the profiled-section recess (13).

85. The composite profiled section as claimed in at least one of claims 72 to 84, wherein the sliding strip (7), at at least one longitudinal edge (110), has rectangular (111) or triangular (113) molded protuberances on at least one of the two longitudinal sides.

86. The composite profiled section as claimed in at least one of claims 72 to 85, wherein the sliding strip (7), along at least one longitudinal edge (110), has a transverse ribbed structure (114) on a narrow side strip or on the entire sliding surface (119) and/or underside (120).

87. The composite profiled section as claimed in claim 86, wherein the transverse ribs (114) are substantially triangular in cross section.

88. The composite profiled section as claimed in claim 86, wherein the transverse ribs (114) are provided with sharp edges.

89. The composite profiled section as claimed in claim 86, wherein the sliding strip (7) has a sharp-edged or pointed surface structure at least on part of its sliding surface (119) and/or underside (120).

90. The composite profiled section as claimed in at least one of claims 86 to 89, wherein the sliding strip (7), on at least one of the two strip surfaces (119, 120), forms a conical point (122) towards the longitudinal edge (110), on one or both sides, on at least one of the two strip surfaces (119, 120).

91. The composite profiled section as claimed in at least one of claims 86 to 90, wherein at least one side face (121) is at an internal angle of less than 90° with respect to the underside (120) of the sliding strip (7).

92. The composite profiled section as claimed in at least one of claims 86 to 91, wherein the sliding strip (7), at at least one of its longitudinal edges (110), has a smaller strip thickness (117) on one or both sides.

93. The composite profiled section as claimed in at least one of claims 72 to 92, wherein the sliding strip (7.6), as a profiled section, is of convex design on one or both sides at one of its strip surfaces (119, 120).

94. A process for producing a composite profiled section having a basic profiled section (1) made from a material with good electrical conductivity and at least one surface coating which is joined to the basic profiled section (1) and is made from a material with a higher resistance to abrasion, in particular a wearable strip (19) of stainless steel, by producing a mechanical and positively locking connection, in particular for producing composite profiled sections as claimed in at least one of claims 1-93, wherein a joining material (59) or material of a joining profiled section (11, 39, 66, 69, 74) is pressed and/or calked into recesses (27), indentations (77, 78) or stamped-in portions (82) and produces a mechanically positively locking, material-to-material join between basic profiled section (1) and wearable strip (19).

95. A process for producing a composite profiled section having a basic profiled section (1) made from a material with good electrical conductivity and at least one surface coating which is joined to the basic profiled section (1) and is made

from a material with a higher resistance to abrasion, in particular a wearable strip (19) of stainless steel, by producing a mechanical and positively locking connection, in particular for producing composite profiled sections as claimed in at least one of claims 1-93, wherein a joining material (59) or material of a joining profiled section (11, 39, 69) is pressed and/or calked into recesses (27) and, by static friction with the basic profiled section (1) and the inner surfaces of the recesses (27) in the wearable strip (19), joins the wearable strip (19) to the basic profiled section (1) in a nonpositively locking manner.

96. The process as claimed in claim 94 or 95, wherein the recesses (27) or the like in the steel strip (19) are made before the bending of steel-strip limb (20) of the steel strip.

97. The process as claimed in claim 94 or 95, wherein connecting webs (21) are formed and shaped substantially prior to the bending of the steel-strip limbs (20).

98. The process as claimed in claim 94 or 95, wherein the bending of the steel-strip limbs (20) along the longitudinal edges (23) takes place at least in part prior to the assembly of the steel strip (19) with the basic profiled section (1).

99. The process as claimed in claim 94 or 95, wherein in some cases residual bending of at least one steel-strip limb (20) takes place while the steel strip (19) is being assembled with the basic profiled section (1).

100. The process as claimed in at least one of claims 96 to 99, wherein during the assembly of the steel strip (19) with the basic profiled section (1) a further plastic deformation of at least parts of the steel strip (19) takes place.

101. The process as claimed in at least one of claims 94 to 100, wherein the assembly of the steel strip (19) takes place by means of calking bars (69) or grooved wedges (74), as a result of calking tongues (73) being pressed through the recesses (27) in the steel strip (19) and into calking grooves (67) in the basic profiled section (1) and/or being calked therein.

102. The process as claimed in at least one of claims 94 to 100, wherein the assembly of the steel strip (19) takes place by means of rivets, screws or similar connecting elements, as a result of these elements being hammered or screwed through the recesses (27) into the calking groove (67) in the basic profiled section (1) or being connected using the appropriate joining technique.

103. The process as claimed in at least one of claims 94 to 100, wherein profiled-section limbs (11) of the rail head (3) or limbs (41) of separate joining profiled sections (39) are pressed onto the steel-strip limbs (20) from the outside and in the process are plastically deformed.

104. The process as claimed in at least one of claims 94 to 100, wherein by means of calking tools material of the profiled-section limb (11) is calked into the recesses (27) in the steel strip with plastic deformation.

105. The process as claimed in claim 104, wherein outer and/or inner profiled-section thickened parts (43, 45) of the profiled-section limbs (11) or joining profiled sections (41) are pushed or forced (stamped) into the recesses (27) in the steel strip (19).

106. The process as claimed in claim 104 or 105, wherein the calked material of the profiled-section limbs (11) at least partially fills the recesses (27).

107. The process as claimed in at least one of claims 94 to 106, wherein the inner side of the steel-strip limb (20) is pushed against a profiled-section molded protuberance (37) of the rail head (3) and the joining webs (21) of the steel

strip (19) at least partially push themselves into the profiled-section molded protuberance (37).

108. The process as claimed in at least one of claims 94 to 107, wherein the steel-strip limbs (20) are mounted towards rail foot (9) or profiled-section center, forming a tensile stress which continuously pulls the steel strip (19) onto the rail head (3).

109. The process as claimed in at least one of claims 94 to 107, wherein the steel strip (19), without bulging or with oppositely directed bulging, is fitted onto the rail head (3) and the steel-strip limbs, during assembly, are pressed toward rail foot (9) or profiled-section center, with the result that the steel strip finally acquires its definitive outer contour or its outer radius (R).

110. The process as claimed in at least one of claims 94 to 109, wherein the mounting of the steel strip (19) in sections takes place by means of hydraulic pliers units.

111. The process as claimed in at least one of claims 94 to 110, wherein the mounting of the steel strip (19) in sections takes place by means of a press, e.g. a punching press.

112. The process as claimed in at least one of claims 94 to 111, wherein the mounting of the steel strip takes place continuously by means of pressure-exerting rollers and/or calking rollers.

113. The process as claimed in at least one of claims 94 to 112, wherein a sliding strip (7) is pushed or rolled into a profiled-section notch (13, 109) and the sliding strip (7) is held resiliently using the elasticity of the material, e.g. spring metal sheet.

114. The process as claimed in at least one of claims 94 to 112, wherein a sliding strip (7) is pushed into and/or wedged in a profiled-section notch (13, 109) or insert grooves (95) and undercuts (93).

115. The process as claimed in at least one of claims 94 to 112, wherein a sliding strip (7) is pressed, rolled, and calked into one of the profiled-section notches (13, 109) in the basic profiled section (1), plastic deformation occurring at parts of the basic profiled section (1).

116. The process as claimed in claim 114 or 115, wherein the transverse ribbed structure (114) or other triangular or pointed molded protuberances on the underside of the sliding

strip (7) presses into the basic profiled section (1) with plastic deformation.

117. The process as claimed in one of claims 114 to 116, wherein tooth-like (111) or triangular (113) molded protuberances on the longitudinal edge (110) of the sliding strip (7) push themselves, with plastic deformation, into inner flanks (91) of the profiled-section recesses (13) or inner surfaces of the insert groove (95) or undercuts (93), etc.

118. The process as claimed in at least one of claims 114 to 117, wherein a sliding strip (7) is joined to the basic profiled section (1) by means of connecting elements (99), e.g. rivets or screws or similar securing elements.

119. The process as claimed in at least one of claims 114 to 118, wherein a molded strip protuberance (107), by means of bolts being pushed in or simply by means of calking tools, is pressed transversely onto the groove walls of the securing groove (101) and/or into the undercut (96) and, through plastic deformation of the sliding strip and/or the securing groove, is joined to the basic profiled section (1).